MIL-I-8673(Aer)
31 May 1955
Superseding SR-26B
30 September 1943

MILITARY SPECIFICATION

INSTALLATION AND TEST OF AIRCRAFT FLEXIBLE WEAPONS SYSTEMS

This specification has been approved
by the Bureau of Aeronautics, Department of the Navy

1. SCOPE AND CLASSIFICATION

1.1 Scope: This specification establishes the general requirements for installation of flexible weapons systems in naval aircraft.

1.2 Classification: Flexible weapons systems shall be of two types as follows:

1.2.1 Type I - Locally Controlled Flexible Weapons System - This system is operated by a crew member located on or in close proximity to the movable weapons platform and line of sight to the target as established by the operator.

1.2.2 Type II - Automatic and/or Remote Control - An automatic and/or remotely controlled flexible weapons system is one wherein the search and tracking functions are accomplished by means of electronic or other apparatus, without benefit of operator line of sight information. In such a system, the controls for operating the system are usually located in a portion of the aircraft at some distance from the flexible weapons platform.

2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, drawings, and publications, of the issue in effect on the date of invitation for bids, forms a part of this specification.

SPECIFICATIONS:

Military

MIL-D-5028(ASG)	Drawings and Data Lists; Preparation of
MIL-T-5029	Tests, Aircraft Armament Installations and Accessories
MIL-B-5087	Bonding; Electrical (For Aircraft)
MIL-W-5088	Wiring; Aircraft; Installation of
MIL-E-5400	Electronic Equipment, Airborne General Specification for
MIL-T-5422(ASG)	Testing; Environmental, Aircraft Electronic Equipment
MIL-H-5440	Hydraulic Systems, Design; Installation and Tests of Aircraft
MIL-P-5518	Pneumatic System Design, Installation and Tests in Aircraft
MIL-T-5842	Transparent Areas, Anti-Icing Defrosting and Defogging Systems; General Specification for
MIL-T-5952	Transparent Assemblies, Aircraft, Optical, Inspection of
MIL-I-6051	Interference Limits and Methods of Measurement; Aircraft Radio and Electronic Installations
MIL-E-7080	Electrical Equipment; Installation of; Aircraft General Specification

SPECIFICATIONS (CONT'D):

MIL-F-7179	Finishes and Coatings; General Specification for Protection of Aircraft and Aircraft Parts
MIL-R-7705(ASG)	Radomes, General Specification
MIL-E-7894	Electric Power, Aircraft Characteristics of
MIL-I-8500(ASG)	Interchangeability and Replaceability of Component Parts for Aircraft
MIL-I-8671(Aer)	Installation of Droppable Stores and Associated Release Systems in Naval Aircraft
MIL-I-8675(Aer)	Installations; Aircraft Armor
MIL-I-8677(Aer)	Installation of Armament Control Systems and Associated Equipment in Naval Aircraft
MIL-I-8700(ASG)	Installation and Test of Electronic Equipment
MIL-D-8706(Aer)	Data, Design: Contract Requirements for Aircraft
MIL-F-15733	Filters, Radio Interference
MIL-L-18276(Aer)	Lighting, Aircraft Interior, Installation of

Bureau of Aeronautics

SD-24	General Specification for Design and Construction of Airplanes for U. S. Navy
SR-38	Demonstration of Piloted Airplanes
SR-107	Heating and Ventilating Equipment, Aircraft Installation of

STANDARDS:

MS-33540(ASG)	Safety Wiring; General Practices for

PUBLICATIONS:

Armament Technical Memorandum No. 3	Methods and Procedures for Determining the Vulnerability of Various Naval Aircraft

DRAWINGS:

AND 10398	Metals - Definition of Dissimilar

(When requesting specifications, standards, drawings, and publications refer to both title and number. Copies of this specification and applicable specifications may be obtained upon application to the Commanding Officer, U. S. Naval Air Station, Johnsville, Pennsylvania, Attention Technical Records Division.)

3. REQUIREMENTS

3.1 Installation Requirements: The flexible weapons system shall be installed in accordance with this specification, with approved applicable detail equipment installation specifications and drawings, with approved equipment handbooks, and with such other approved or alternate or additional information available to the airframe contractor and approved by the procuring activity.

3.1.1 Precedence: In case of conflict between the requirements of this specification and the requirements of any detail installation or test specification for flexible weapons systems, the requirement of the detail specification shall prevail.

3.1.2 General: The aircraft contractor shall install the appropriate flexible weapons systems in a manner commensurate with skilled aircraft manufacturing and assembly practices. The completed installation shall be such that no deleterious effects will result to the performance, reliability and/or functioning of the aircraft or the flexible weapons systems when demonstrated in accordance with the requirements of Bureau of Aeronautics Specification SR-38.

3.1.2.1 Modifications: The contractor shall continually consider possibilities for improving the flexible weapon system with a view toward improving its reliability, operation and efficiency. The contractor shall not alter, rework, or modify government furnished equipment or contractor furnished equipment built to and meeting government specifications, unless authorized or directed by the procuring agency.

3.1.3 Information and Liaison: Detailed information relative to the specific flexible weapons systems, i.e. drawings, specifications, etc. may be obtained upon application to the Chief, Bureau of Aeronautics. However, the aircraft contractor shall maintain active liaison with the flexible weapons systems contractor throughout the design and construction of the applicable aircraft in order to insure a continual interchange of airplane-system design information so that a satisfactory, efficient and compatible turret system will result.

3.1.4 Required Data and Drawings: Drawings and engineering design data pertinent to flexible weapons installations shall be submitted to the Bureau of Aeronautics as early as possible in accordance with the requirements of Military Specification MIL-D-8706(Aer), Data, Design: Contract Requirements for Aircraft. Drawings shall be prepared in accordance with MIL-D-5028.

3.1.5 Safety: The installation shall be such as to provide maximum safety to personnel while installing, operating or interchanging a complete equipment, assembly, or component thereof in aircraft. Satisfactory means shall be provided to prevent personnel from accidentally coming in contact with any damaged and exposed circuitry.

3.2 Materials: Materials used in flexible weapons systems installations shall be of the best quality, light in weight and suitable for the purpose intended. The materials shall be in accordance with applicable government specifications, wherever possible. Selection and substitution of materials shall be as required in Bureau of Aeronautics Specification SD-24 and/or the applicable aircraft detail specification.

3.2.1 Corrosion Prevention: In general, the use of magnesium or other materials subject to rapid deterioration in salt atmosphere in the installation of a flexible weapons system for seaplanes is prohibited. Similar use in land based aircraft is permitted where applicable. If such materials are essential for weight control purposes in noncritical applications, the airframe contractor shall submit a listing of the proposed applications for approval by the procuring agency. In all installations, the use of dissimilar metals in intimate contact shall be avoided unless proper insulation procedures are observed. Dissimilar metals are defined in Drawing AND 10398.

3.2.2 Nonmetals: Nonmetals used, including plastics, fabrics and protective finishes, shall, insofar as practicable, be moisture and flame resistant; shall not support fungus growth, or shall be so treated as not to support fungus growth; and shall not be adversely affected by aircraft fluids, i.e. oils, grease, etc.

3.2.3 Contractor's Specifications: Material and equipment conforming to contractor's specifications may be used, provided there are no applicable government specifications and the contractor's specifications are approved by the procuring agency. If contractor's specifications are used, the contractor shall, when required by the procuring activity, provide samples for test. The use of contractor's specifications shall not constitute waiver of government inspection.

3.2.4 Standard Parts: Standard parts (MS, AN or JAN) shall be used in the installation of equipment wherever they are suitable for the purpose, and shall be identified on drawings by their part numbers. Commercial utility parts such as screws, bolts, nuts, cotter pins, etc. may be used, provided they possess suitable properties and are replaceable by standard parts without alteration, and provided the corresponding standard part numbers are referenced in the parts list and on the contractor's drawings. In the event there is no suitable corresponding standard part in effect on date of invitation for bids, commercial parts may be used provided they conform to all requirements of this specification.

3.2.5 Interchangeability and Replaceability: Interchangeability and replaceability of flexible weapons installations shall be governed by MIL-I-8500.

3.3 Equipment (General): The aircraft contractor shall provide adequate safety devices, fittings, attachments and supporting structure for the applicable system to facilitate proper and safe operation and maintenance of all weapons system components. All parts and equipment necessary for the proper operation and functioning of flexible weapons systems which are not specified in the aircraft detail specification as government furnished, shall be furnished and installed by the aircraft contractor. Installation of contractor furnished parts and equipment will be subject to Bureau of Aeronautics approval. Consideration will be given to new-type equipment proposed by the contractor, but such equipment shall not be installed in lieu of government furnished or approved type contract r furnished equipment, unless specifically approved by the Chief, Bureau of Aeronautics.

3.4 Strength Requirements for Flexible Weapon System Installation: Adequate strength shall be provided in the aircraft mounting structure attaching fittings, brackets, supporting members and

carry through structures to withstand the loads imposed by the operation and random or synchronized firing of the specific flexible weapon system under all combinations of translational and rotational velocities and accelerations for which the aircraft is designed and without deleterious effects to the performance of the installed flexible weapon system. The design ultimate and design yield factors of safety shall be as specified in the aircraft detail specification. The design loads must be distributed into the primary aircraft structure in a manner which will prevent local distortion and fatigue failures. The natural period of vibration of the turret mounting structure shall be sufficiently different from the fundamental and/or harmonic periods of vibration of the flexible weapon system components as to avoid resultant deterimental effects to the installation or to the aircraft structure. Supporting members, brackets, etc., used to support equipments located in crew compartments shall be designed to withstand, without separation, impact shocks due to crash conditions as specified in the applicable detail specification.

3.5 Weight: The total weight of flexible weapons systems installations shall be held to a minimum consistent with the strength, material and other requirements listed herein.

3.6 Location and Mounting of Flexible Weapons System Components: In general, the proposed location of all flexible weapons system components shall be displayed in the airplane mock-up, shall be as approved by the Mock-up Board and shall be changed only after approval of the Bureau of Aeronautics.

The specific location of major components shall be chosen judiciously with adequate consideration being given to problems of access, maintenance, ground or afloat operation, flight operation, minimum drag of external components, etc. Unrealistic compromise of installation design merely to facilitate external airframe cleanliness shall be avoided. Location of fragile components such as sighting enclosures, radomes, etc., shall be such as to minimize damage or destruction during normal airplane flight, ground or afloat operation. For example: A mast antenna mounted directly forward of a protruding sighting enclosure is a hazardous installation due to the possibility of collected ice drifting back against the enclosure.

3.6.1 Mounting Fixtures: A template(s) to control the parallelism, planimetry, location and normality of weapons platform trunnion and sighting arrangement mounting points will be furnished by the government to the party installing the flexible weapons system. If applicable, the mounting surfaces of radomes, etc., shall also be controlled by fixtures supplied to the airframe manufacturer.

3.6.2 Mounting Position: Units shall not be mounted or installed in any manner other than that for which the units or the mountings are designed. In cases where the units or mountings are to be installed at angles greater than 10 degrees from the designated angle in the normal flight attitude of the aircraft, the contractor shall request approval of the procuring activity. The use of contractor furnished fixed mounts as an alternate to government furnished mounts on black box components may be permitted subject to prior approval of the procuring activity; said approval to be based on substantiating data to be submitted by the contractor. Precisely aligned mechanical components shall be mounted as per applicable installation drawings.

3.6.2.1 Shock Mounting of Components: Shock and/or vibration insulators will normally be supplied with each weapons system components to be installed. In the early design stages of the airframe, it shall be incumbent upon the airframe contractor to advise the procuring activity and the weapons system designer of any unique, severe, or suspected shock or vibration conditions peculiar to his airframe design or operation. Systems components will normally be designed to the requirements of Specification MIL-E-5400 with respect to shock and vibration and should be so installed as to remain within these limits.

3.6.3 Presentation Devices: Cathode-ray indicators and similar presentation devices shall be installed at normal eye level in front of the operator to provide maximum readability and ease of adjustment at all times during operation. When more than one presentation device is to be located in one operating position, the contractor shall obtain the desired priority for choice location from the procuring agency.

3.6.4 Mounting and Installation: Flexible weapons systems shall be so mounted and installed so as not to be subject to conditions exceeding the limits specified in the applicable equipment specifications, unless the contractor submits for the approval of the procuring activity, a proposal, substantiated by test data, that the limits can be exceeded in a particular case.

3.6.5 Mounting Hardware: Machine screws or bolts of suitable diameter shall be used for mounting flexible weapon system components. Self-tapping screws shall not be used for mounting equipment or for making electrical connections.

3.6.6 Safety Wiring: Equipment snap-slide fasteners and other fastening devices that provide for means of safetying shall be safety wired to prevent loosening during flight. When components have four snap-slide fasteners, it will be necessary to safety wire only two diagnonally opposite fasteners. Tape of any nature shall not be used for safetying components; wiring shall be in accordance with Military Standard MS-33540.

3.6.7 Protection: Moisture pockets, walls, traps and the like, in which water, condensed moisture or other aircraft fluids can collect when the equipment is in normal operating position shall be eliminated or properly drained. Protection shall be provided against water or aircraft fluid leakage and condensation on equipment, excessive heat and combustible vapors and fluids. Protection shall be provided against physical damage, such as may be caused by abrasion, crew movements, inadvertent operation of controls, loading and shifting of cargo, loading of armament and munitions and ejection of shell cases, clips, sonobuoys, flares, etc. The equipment shall be installed so as not to cause damage to or be damaged by other equipment, wiring or plumbing.

3.7 Provisions for Environmental Conditions: The flexible weapons installations shall operate satisfactorily within the environmental conditions prescribed in Specifications MIL-E-5400 and MIL-T-5422. Suitable protection shall be provided in the aircraft to prevent malfunction or corrosion of weapons, ammunition systems, or other installation components due to fungi, salt water spray, dust and rain storms. The flexible weapons installation shall operate satisfactorily within the altitude and speed ranges specified for the aircraft in the applicable aircraft detail specification.

3.8 Accessibility: Satisfactory access shall be provided in flexible weapons installations to enable safe and efficient operation, installation, removal, adjustment and maintenance of the electrical and electronic components, weapons, ammunition, feed and ejection systems and other components. Hand holes and/or quickly securable doors shall be provided in the aircraft for this purpose, if required. Such doors, if used, shall be kept to a minimum required size and shall be so hinged that the slip stream will tend to hold them in a closed position. Removal of any weapon shall be possible without disturbing adjacent weapons.

3.8.1 Ventilation and Lighting Access: Most Type II system components will be located in close quarters where ground maintenance is difficult. If the airframe design permits, suitable hatches, transparent panels, or other provisions for the admission of natural light and air shall be included at strategic locations to ease the ground maintenance problem.

3.8.2 Accessory Stowage: The airframe contractor shall provide stowage in the airframe for equipment which may be required in the operation of the weapons system or which must be readily available for the maintenance of the system, (i.e. a console viewing hood or a special feeder winding tool). It shall be the responsibility of the airframe contractor to obtain a list of the items in this category from the Bureau of Aeronautics.

3.9 Tie-in to Airplane Prime Power: In installation of weapons systems it may be highly desirable to supply certain electrical, hydraulic or pneumatic power requirements from a central source in the airframe. Such pooling of requirements is recommended where substantial savings in weight, cost or complexity results. If such tie-in is used, the airframe contractor shall control the voltages, frequencies, flows and pressures of the system inputs to a degree compatible with satisfactory system operation under all flight and combat conditions. Specifications for hydraulics and pneumatics system design for supplying weapons systems shall be in accordance with the airplane detail specification. Quick disconnects at strategic locations shall be provided in hydraulic and air lines to facilitate removal, checking or installation of components or major aircraft sections. Electrical and electronic equipment for flexible weapons systems will, in general, be designed for electrical inputs as per Specification MIL-E-7894. The airplane contractor shall furnish electrical power within the specified tolerances at the points of entry to the flexible weapons system.

3.9.1 Priority Operation: In the event that aircraft power, electrical, hydraulic, or pneumatic, is marginal and a compromise supply arrangement is contemplated, the exact nature of the proposed compromise shall be referred to the Bureau of Aeronautics by the aircraft manufacturer for approval prior to installation of the turret system.

3.9.2 Ground Check Facility: In the design of flexible weapon installations the airframe contractor shall give adequate consideration to the need for ground or afloat maintenance and operation of the weapons system. In cases where the weapons system is dependent on aircraft furnished prime power which will not be available during ground or afloat time, special facilities to furnish such supplies of hydraulic oil, electric power or pneumatics as are mandatory for minimum system operation and check out shall be installed or otherwise provided.

3.10 Electrical Provisions:

3.10.1 Shielding of Sensitive Elements: The weapons system components furnished to the airframe contractor will be capable of satisfactory operation under normal interference free conditions with all reasonable precaution taken to avoid the necessity for external shielding. Any external shielding of weapons system components to avoid induced effects, such as might be experienced near heavy electrical busses, shall be the airframe contractor's responsibility. In addition, the external shielding of weapons system components which produce undesirable effects on other installed equipments shall also be the airframe contractor's responsibility.

3.10.2 Wiring, Cables and Connectors: Interconnecting wiring, cables and connectors shall be installed in accordance with the individual equipment interconnecting wiring diagram or cable diagram, or both, and in accordance with Specification MIL-W-5088. Installation circuits shall be coded in accordance with MIL-W-5088. In case of discrepancy between Specification MIL-W-5088 and the requirements of applicable drawings furnished by the procuring activity, the drawings shall prevail. Cables shall not be routed through equipment mounting bases. Cables shall be of sufficient length and shall be so supported as not to interfere with the operation of vibration isolators. Cables shall be cut with sufficient excess length to facilitate at least one service replacement of connectors.

3.10.2.1 Connectors: Approved connectors shall be installed where cables are routed through structural members requiring a disconnect for pressurization or to facilitate production assembly. Extra contacts in connectors shall be provided in accordance with the requirements of MIL-E-5400. All RF connectors, except bayonet-locking types, located in positions inaccessible in flight, shall be safety wired.

3.10.2.2 Moistureproofing of Cables: Cabling shall have approved moistureproof coatings to preclude the possibility of moisture infiltration due to direct exposure or other environmental conditions. Such treatment shall not be injurious to the electrical conductivity or contacts at the connections.

3.10.3 Circuit Protection: All circuit protection external to flexible weapons systems equipment shall be provided by the aircraft contractor in accordance with the applicable requirements of MIL-I-8700.

3.10.4 Switches: All switches required shall conform to the requirements of Specification MIL-I-8700.

3.10.5 Lighting Provisions: Suitable overhead, drop or other lighting provisions shall be installed in the aircraft to provide adequate lighting for operation and maintenance of the turret system during airborne and ground operation.

3.10.6 Test Equipment Outlets: Power outlets for special test equipment used in the maintenance of the weapons system shall be installed in the aircraft where indicated on the weapons system wiring schematics supplied by the system manufacturer.

3.11 Operator's Provisions: Type I weapons systems will normally be furnished to the contractor complete with operator's provisions such as an adjustable seat, safety belt, suit heater outlet, ash tray and foot rest. For Type II systems these items will be contractor furnished. It shall be the contractor's responsibility to provide heating, cooling and/or ventilation at the weapons system operator's station in accordance with Specification SR-107.

Suitable hand holds, steps, or brackets for entering or leaving the operator's station shall be provided, if necessary. Non-skid decking shall be used where essential to prevent injury. All openings, hatches and passageways to flexible weapons installations shall be designed to permit safe and easy, unobstructed access. Permanent mounting of equipment in passageways so as to create an emergency exit hazard is prohibited. Stowage provisions for the operator's parachute shall be as stated in the airplane detail specification. The installation design shall be such that all system controls and indicators are arranged for maximum convenience and minimum fatigue of the operator.

3.11.1 Oxygen Installation: Oxygen provisions for the flexible weapons system operator shall be as stated in the airplane detail specification. Oxygen mask stowage provisions shall be installed by the airplane contractor, if required. Oxygen provisions only (regulator bracket, low pressure swivel joints, flexible tubing, etc.,) will normally be furnished in Type I systems. All provisions for Type II systems will be contractor furnished.

3.11.2 Interphone Provisions: An interphone station box shall be placed adjacent to the weapons system operator and shall have transmitting and receiving services comparable to other secondary crew positions. In cases where system operator and equipment are separated, a station box suitable for ground maintenance communication shall be installed convenient to the major mounted system components unless otherwise provided in the system. Foot operated microphone switches shall be used at the operator's station.

3.12 Weapons and Weapons Platform Considerations:

3.12.1 Boresighting and Harmonization: Each flexible weapons system furnished for installation in accordance with this specification shall be accurately checked for proper alignment of sight line and weapons platform as per the system installation drawings. No convergence of dual weapons and no parallax compensation for sight and bore line non-coincidence is required in the normal installation. Dual weapon bore lines, if applicable, shall be parallel with 1/2 mil. Boresighting and harmonisation procedures shall be as called out in the system maintenance handbooks or data and unless otherwise specified, standard Navy boresighting tools for the applicable bores shall be used. Mechanical boresight of the weapon platform to the line of sight shall be within 1/2 mil when measured with sighting enclosure or dome removed.

3.12.2 Alignment of Weapons: The alignment of the flexible weapons shall be in accordance with the alignment criteria and requirements which are contained in Specification MIL-I-8677(Aer), Installation of Armament Control Systems and Associated Equipment in Naval Aircraft. Boresighting fixtures shall be provided as required in the above referenced specification.

3.12.3 Muzzle Blast: Flexible weapons systems shall be provided with blast protective measures suitable to the specific need.

3.12.4 Weapon and Ammunition Heating or Cooling: If required, weapon heating and/or cooling provisions will be as specified in the aircraft detail specification. Ammunition heating or cooling provisions shall be adequate to insure safety and satisfactory firing of all ammunition associated with the installation under conditions specified in paragraph 3.14. In flight, the ammunition is to be maintained about 35°F but not to exceed 160°F. (Provision shall be included for maintaining temperatures at +35°F to +160°F in the ammunition compartments, for 2 hours, while the airplane is on the ground.) Ammunition temperatures shall be assumed to be 50°F to 70°F at the time of loading. Installation of ammunition heaters, if necessary, shall be in accordance with SR-107 as applicable. Heating or cooling provisions shall be contractor furnished unless government furnished equipment is specified in the aircraft detail specification or applicable flexible weapons system.

3.12.5 Weapon Charging: A manual, hydraulic, pneumatic or electrical charging system, as specified in the aircraft detail specification or as supplied as GFE installed.

3.12.6 Weapon Firing Controls: All necessary wiring, fuses, connectors, switches, other electrical system components (except government furnished equipment) shall be furnished and installed by the aircraft contractor as required to fire the weapons. The contractor shall install the necessary equipment for providing the power specified on the applicable system wiring diagrams to the weapon installation for appropriate distribution.

3.12.7 Firing Interrupters: Fire interrupters, if applicable, will be furnished with the flexible weapons system to be installed. However, the aircraft contractor will be required to furnish the necessary aircraft data needed to design the required interrupters. In the event that any aircraft shape or loading changes after the original pattern of required interruption, or in the event that a specific weapons system is applied to follow-on or similar aircraft types, the aircraft contractor shall notify the Bureau of Aeronautics of any necessity for change in interrupter pattern. Fire interrupters shall be capable of breaking the firing circuit of each weapon using electric primed ammunition individually when the bore line of that weapon approaches to within 20 mils ± 8 mils of the aircraft envelope. (The aircraft envelope is the nominal outline of the airplane plus 10 mils for manufacturing tolerance). The outline of the airplane shall be considered to contain all portions of the aircraft, except opened flaps, wire antennas, extended wheels and landing gear throughout all combat loading conditions. For percussion-fired ammunition, fire interrupters shall provide a minimum clearance over envelope equal in mils to the displacement of the weapon platform and maximum rate for the full time constant of one round fired from the weapon at minimum firing rate.

3.12.8 Structural Interrupters: Contour stops for all flexible weapons systems will be provided by the equipment contractor to enable the weapon platform or carriage to be brought to a gradual stop at the limits of its travel and to guide the weapons past such physical obstructions as may be due to shape peculiarities of the aircraft design. The aircraft data necessary to insure compatible

design of such interrupters, i.e, information which defines the location of aircraft structure, fairings, crew compartments, etc. under all flight conditions shall be furnished to the equipment manufacturer by the aircraft contractor. It is incumbent upon the airframe contractor to determine, when any additional changes to the airplane configuration are made, whether existing turret interrupters afford adequate protection during operation of the flexible weapons system.

3.12.9 Ventilation: The contractor shall provide suitable means for preventing the accumulation of explosive gases in compartments or housing of the flexible weapons system. The aircraft contractor shall also make the necessary provisions to insure that gases will not enter into any unventilated portions of the aircraft. Measurements of gas concentrations shall be made by government approved gas measurement equipment. Ventilation or gas collection shall be adequate to prevent the following concentrations:

Type I Systems: Not to exceed 60% of the lower explosive limit after firing the maximum single burst from all weapons of the specific weapons system.

Type II Systems: Not to exceed 90% of the lower explosive limit under the same requirement stated for Type I Systems.

For gun systems the maximum single burst is defined as 100 rounds. For other weapons the applicable burst length shall be obtained from the procuring activity.

3.12.10 Weapon Removal: Flexible weapons systems shall be designed and installed in a manner which will enable a ground crew of two to remove all weapons in a maximum time of fifteen minutes and reinstall all weapons in a maximum time of twenty-five minutes. Arrangement of pneumatic lines, electrical connections, hydraulic lines and chuting shall prevent incorrect connections and accidental interchange of lines, etc. between weapons. Safety wiring shall not be required for holding bolts, pins, etc. which must be removed and reinstalled when weapons are removed and installed during field servicing.

3.12.11 Rearming Instructions: Determination of the most efficient procedure for rearming the flexible weapons system shall be made and written instructions prepared and included in the applicable Handbook of Maintenance Instructions. This determination and preparation shall be made in conformance with the related requirements contained in Specification MIL-I-8671(Aer), Bureau of Aeronautics Specification for the Installation of Droppable Stores and Associated Release Systems in Naval Aircraft. Rearming procedures shall be predicated on the use of a maximum number of two men.

3.12.12 Ease of Rearming: Arrangement of flexible weapons installations shall facilitate efficient and safe rearming of all guns under all loading and operating conditions expected to be encountered by the applicable aircraft in service ashore and/or afloat. Rearming procedure shall not require ground crews to stand or walk on fuselage or wing surfaces outside of the designated areas provided for this purpose. Special equipment shall not be required for rearming the weapons.

3.12.13 Ammunition Supply and Feed System: The aircraft contractor shall provide for the full ammunition supply as stated in the aircraft detail specification and, if required, a method of feeding this supply to each weapon of the system as needed, intermittently or continuously, under all combat acceleration loads. (Unless otherwise specified in the aircraft detail specification, a full load shall be the total number of rounds which can be fired in 30 seconds at the normal rate of fire of each weapon as specified by the Bureau of Aeronautics.) Ammunition boxes shall be installed in a position which will require the least auxiliary boost and feed chutes or channels of minimum length consistent with location requirements of adjacent equipment, and weight and balance of the aircraft. Twists and bends in 20MM feed chutes shall not be less than the turn and bend radii shown in Figure 1. (Recommended minimum bend and turn radii for other type chutes will be furnished by the Bureau of Aeronautics upon request.) The inner surfaces of the ammunition boxes and feed chutes or channels shall be smooth and free from any protrusions which might obstruct the continuous passage of the ammunition. The bottom of the box shall be adequately shaped and reinforced to prevent damage to a fully loaded box when slid across rough floors or decks. A drain hole shall be located in each bottom corner of the ammunition box to eliminate moisture accumulation. Belt layer separators may be utilized in the ammunition boxes to prevent link to link contact between the layers of the belt. Figure 2 illustrates the preferred type. If space or weight limitations make it necessary, more than one box may be provided for each weapon. The loaded weight of a single box should not exceed 100 lbs. Each box in the weapon installation shall be provided with a positive locking device which will hold the box securely in its mounting. Lifting handles on each box are required. Self-adjusting or canted false box bottoms or other satisfactory devices may be provided to insure uninterrupted ammunition flow during combat maneuvers. The supporting structure for the ammunition box shall be sufficient in strength and rigidity to withstand stresses to which it will be subjected with a fully loaded box and the aircraft operating under conditions imposing maximum flight accelerations on the aircraft.

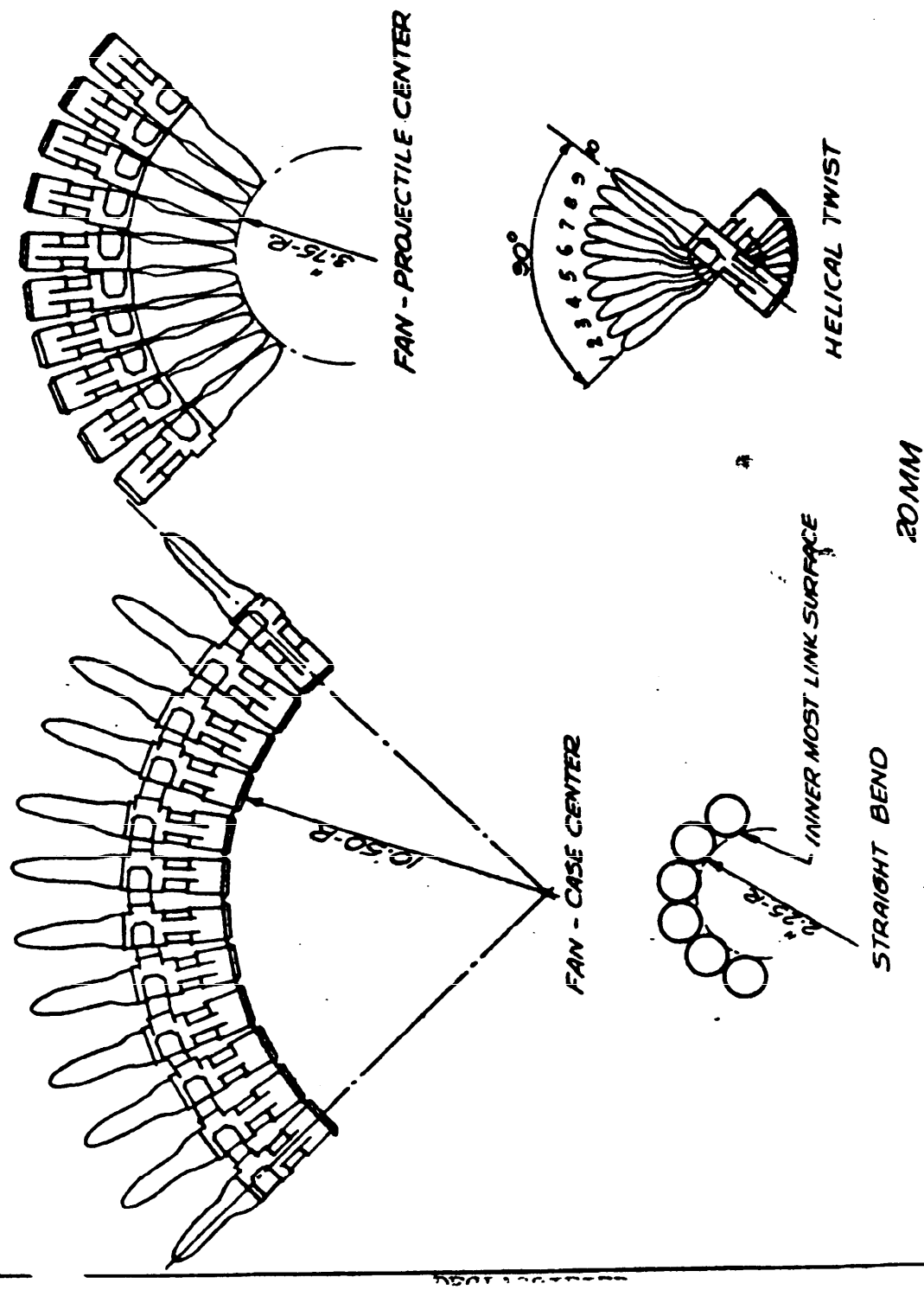

FIG. 1.

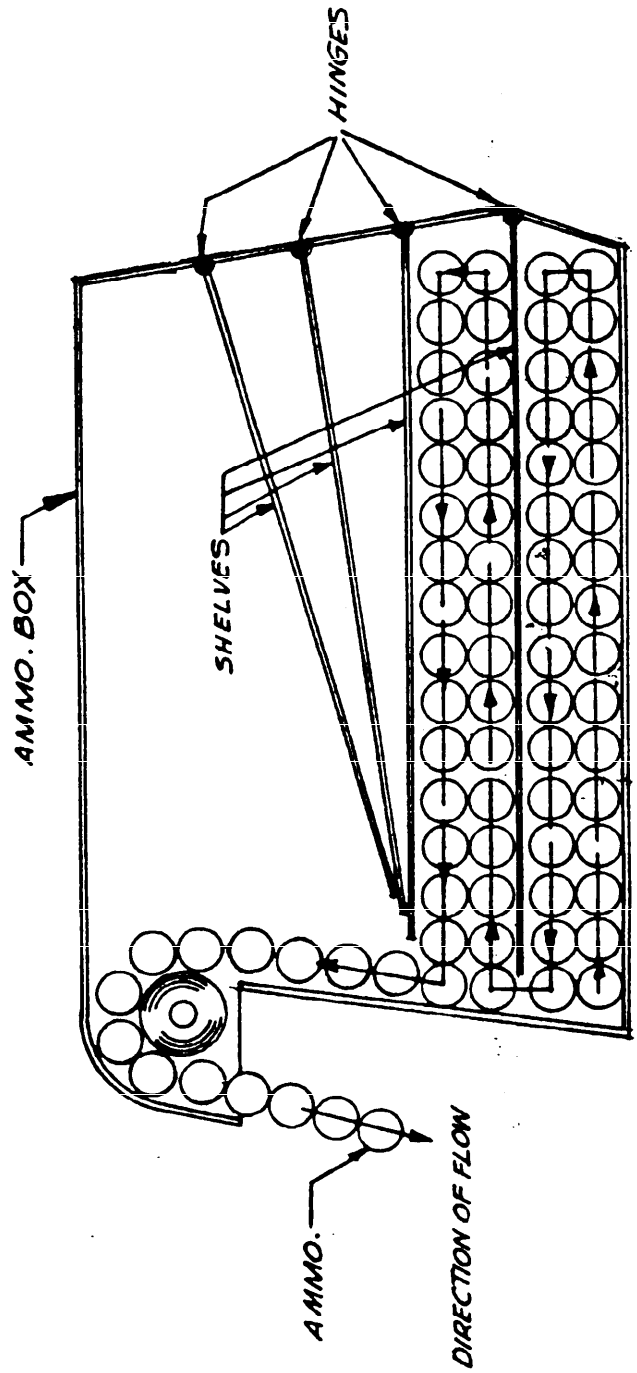

FIG 2

3.12.14 Ejected Case and Link Discharge or Stowage Provisions: If required by specific weapons system, the aircraft contractor shall provide for the discharge or stowage of expended ammunition cases and links. Case ejection chutes shall be of minimum length compatible with aircraft design and shall be constructed with a minimum number of bends and twists. The chutes shall have sufficient width to permit passage of a complete round of ammunition endwise through the chute. The ejected case and link stowage compartment shall be undivided, unless it is incompatible with the aircraft design and shall be of such dimensions as to provide adequate space for containing all ejected cases and links discharged from the required full load of ammunition. Provisions shall be included to facilitate removal of the cases and links by ground crew during re-arming of the aircraft. The case and link chute entrances into the compartment shall be located and constructed adequately to prevent the ejected cases from rebounding into the weapon mechanism, in addition to preventing the cases and links in the compartment from obstructing the entrances during all aircraft maneuvers.

3.12.15 Clearance for Ejected Cases and Links: If the installation requires the discharge of ejected cases and links from the aircraft, the location and construction of the discharge outlet shall positively insure adequate clearance between the discharged cases and links and all surfaces of the aircraft which might be damaged by the impact of the discharged cases and links. The cases and links shall discharge properly under all required combat attitudes and speeds.

3.13 Flight Data Instrumentation: Flexible weapons systems will normally require computer inputs of such items as true air speed, relative air density and temperature. For installation wherein these data or portions thereof are furnished from a common source to several systems within the airplane, the contractor shall ascertain the acceptable tolerance on these data as supplied to the weapons system and furnish inputs of these values. Where separate flight data instruments are furnished within the weapons system they shall be suitably located on the airframe so as to register accurately.

3.14 Airframe Weatherproofing and Seals: For installations wherein the flexible weapons system does not also include an integral portion of the airframe, the contractor shall be required to furnish such seals, etc., as will prevent the entrance of the elements at any protrusion or surface penetration of the weapons system through the airframe. Seals shall be designed for minimum friction on moving surfaces and operability under all environments to be encountered by the airplane.

3.15 Sighting Panels, Enclosures, Radomes, etc: Airframe contractor furnished components of the above type shall be developed and manufactured under rigid control which will insure minimum sight line distortion or bias. Prior to installation and use, detail drawings of all such parts showing all control data shall be submitted to the Bureau of Aeronautics for release. Materials used in the manufacture of these parts shall conform to the requirements of the airplane detail specification.

3.16 Cleaning, Defrosting and De-Icing of Sighting Areas or Working Surfaces: Installations which are subject to the formation of ice, fog, salt layers or similar deposits on critical surfaces due to normal operation of the aircraft shall be provided with a suitable medium for preventing or removing such deposits as would render the system incapable of the intended function.

3.17 Hoisting Provisions: Hoisting lugs for removable sections of the airframe designed as housing assemblies for the flexible weapon system shall be provided by the airplane contractor.

3.18 Interference: Radar and other electronic and electrical components of the flexible weapons systems shall be installed so as to be in accordance with Specification MIL-I-6051 with respect to system interwiring and components as furnished by the installation contractor. The entire flexible weapons system shall be checked for radio noise as per the airplane detail specification and a report thereon shall be furnished to the procuring activity.

3.18.1 Filters: Filters shall be in accordance with the requirements of Specification MIL-F-15733 and shall be installed only when it is demonstrated to the procuring activity that they are necessary to insure compliance with Specification MIL-I-6051.

3.19 Armor: The aircraft contractor shall investigate and wherever necessary install armor protection to insure coverage in accordance with Bureau of Aeronautics Specification MIL-I-8675(Aer). It is recommended that the contractor avail himself of a copy of Armament Technical Memorandum No. 3, Methods and Procedures for Determining the Vulnerability of Various Naval Aircraft, for aid and guidance in providing ample protection for flexible weapons systems.

4. QUALITY ASSURANCE PROVISIONS

4.1. Classification of Checks:

4.1.1 Bench Check: Bench checks are those tests accomplished on each flexible weapons systems

received for installation in an aircraft intended for delivery to the Navy. The purpose of these checks is to determine, at the point of installation, if the equipment has been damaged or the performance affected by shipment prior to installation.

4.1.2 Preflight Checks: Preflight checks are those checks accomplished on each aircraft intended for delivery to the Navy after installation of the flexible weapons systems to determine if the system has been properly installed and adjusted.

4.1.3 Flight Tests: Flight tests are demonstrations performed in accordance with the applicable requirements of SR-38 to assure satisfactory installation and operation of the flexible weapons systems as required by the specification and the applicable aircraft detail specification.

4.1.4 Production Flight Checks: Production flight checks are those qualitative checks performed on each aircraft to establish that the entire flexible weapons system is functioning properly in all modes of operation.

4.2 Procedure:

4.2.1 General: Unless otherwise required, all classifications of checks shall be performed. The nature of checking by the airplane contractor shall be qualitative. Where procedures are not specified by the Bureau of Aeronautics, the contractor shall prepare and submit a proposed procedure for checking to the Bureau of Aeronautics for approval.

4.2.2 Test Equipment: Test equipment shall be provided by the contractor except for that specifically designated as government furnished.

4.2.3 Bench Checks: All flexible weapons systems and components shall be bench checked at the point of installation and before installation in the aircraft. The requirements of 3.1.3 shall apply as appropriate. Damaged or faulty equipment shall be reported to the cognizant inspection activity.

4.2.3.1 Unpacking and Visual Inspection: All systems furnished by the government are inspected before shipment. These systems shall be carefully unpacked to avoid damage. Apparent damage to the packing or system shall be noted. Shortages of components shall be noted. Dust and packing material shall be removed from all units. Damaged units shall be reported in accordance with existing instructions.

4.2.4 Preflight Checks: Flexible weapons systems shall be operated to establish that the system has been properly installed and that basic performance requirements have been met. Preflight tests shall be as prescribed in system handbooks and/or supplemented by Bureau of Aeronautics approved procedures as per 3.1.3.

4.2.5 Flight Tests: Flight tests shall be conducted on the flexible weapons systems in accordance with requirements of the airplane detail specification and Bureau of Aeronautics Specification SR-38. The purpose of these tests will be to determine if the requirements of this specification and other applicable specifications have been satisfactorily accomplished. An approved flight demonstration procedure shall be obtained prior to such demonstration.

4.2.6 Production Flight Checks: A flight check of each installed flexible weapons system shall be conducted to insure that the system is operating properly. In general, such checks will not require quantitative checking of antenna patterns, interference levels, ambient temperature levels, accuracy, ranges, etc. unless such items are shown by Flight Tests under 4.2.5 to be marginal or difficult to control in production aircraft.

5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery shall be in accordance with the requirements specified for the applicable aircraft.

6. NOTES

Not Applicable

PATENT NOTICE - When Government drawings, specifications or other data are furnished to manufacturers or others for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise in any manner as licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION

ORGANIZATION *(Of submitter)*		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT $

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)*	DATE

DD FORM 1 APR 63 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE C-8279

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